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Optical Disc Development Trends

927K0136A Moscow RADIO in Russian No 11, Nov 91
pp 6-9

[Article by G. Frolov, Moscow]

[Abstract] The use of compact discs as storage media of computer data, particularly CD-ROM, is reviewed and their development trends are summarized; special attention is focused on Write Once Read Many (WORM) discs which can be custom-made with the help of a special computer-aided unit equipped with a 10 mW laser recorder and played back using any conventional CD-ROM player. The design of a typical WORM disc is examined and its advantages are enumerated. The optical disc recording, erasing, and reading processes are explained and graphically illustrated. The need to increase the data storage capacity of optical discs by increasing their recording density and developing discs with several working layers is identified and attempts to shorten access time by decreasing the mass of optical heads and lasers as well as using multiple beam recording and reading systems are reported. The issue of increasing the optical disc reliability by developing new manufacturing technologies, using error-detecting and error-correcting codes, and improving disc drive designs is discussed. The good outlook for the development of information science on the basis of optical discs is noted and its importance for the country's science, industry, and young entrepreneurs is emphasized. Figures 2; references 1.

Converting MS7004 Keyboard for IBM PC/XT

927K0136B Moscow RADIO in Russian No 11, Nov 91
pp 33-35

[Article by G. Bushuyev, Moscow oblast]

[Abstract] The increasing availability of home-made PC/XT compatible computers and the high cost of keyboards for them (reaching 1,000 rubles a piece) dictated the need to find other alternatives; a method of converting the popular and relatively inexpensive MS7004 keyboards to the PC/XT standard is described. A stage-by-stage conversion procedure is outlined in detail and the need to reprogram the D5 (K573RF2) ROM chip is indicated. It is shown that the new program must contain an algorithm for eliminating the key contact chatter and suppress induced interference. After rewiring the electric circuit, the Cyrillic keys must be painted over with Roman markings. Figures 2; tables 1.

PAL Decoder in VHS Video Tape Recorder

927K0136C Moscow RADIO in Russian No 11, Nov 91
pp 39-43

[Article by Yu. Petropavlovskiy, Taganrog]

[Abstract] Continued from *Radio* No. 10, Oct 91. The circuit diagram of the decoder is cited and the function of each of its components is explained. The phase inverter is executed as a differential amplifier on a DA3 chip and the chromaticity signal demodulator is executed on a DA4 chip. The interface consists of a two-stage transistor amplifier with VT1 and VT2 transistors and an emitter follower with a VT4 transistor. The decoder can be installed in many video cassette recorder models with a 9 V video unit. The wiring diagram of

the decoder and interface connection to the Elektronika VM-12 video cassette recorder and 3USTsT-51-30 TV set is presented; it is noted that most of decoder and interface elements are interchangeable. The decoder tuning and adjustment procedure is outlined and it is emphasized that Elektronika VM-12 video cassette recorders may have certain color adjustment problems affecting the quality of the PAL color image but that the problems are generally resolvable. Figures 3; references 5.

Analog Signal Conversion Devices

927K0136D Moscow RADIO in Russian No 11, Nov 91
pp 48-52

[Article by R. Vilchinskiy, Volgograd]

[Abstract] The use of digital analog signal conversion for recording, transmitting, and processing audio programs by means of analog-to-digital (ATsP) and digital-to-analog (TsAP) converters which largely affect the quality of conversion is discussed. For example, the harmonic coefficient is closely related to the converter's capacity: a perfect 16-bit converter has a maximum attainable harmonic coefficient of 0.002 percent. In general, 12-bit converters are commercially produced by domestic industry; combined with the desire to reduce the memory volume and decrease the transmission rate, this limitation necessitated the development of a new version of multilevel delta-modulation whereby a signal which is close in value or equal to the input signal is converted when the value of the difference between the present value of the signal and the signal recovered from the digital sequence is small; consequently, the transmission error does not significantly affect signal reconstruction, as in the case of pulse-code modulation (IKM). As a result, the new method is often referred to as PCM-complemented multilevel delta-modulation. A block diagram of the device realizing this method is presented and its components and operating principle are described. To be continued. Figures 3; references 6.

Small-Scale 'Nevskiy-402' Radio Broadcast Receiver

927K0136E Moscow RADIO in Russian No 11, Nov 91
pp 54-56

[Article by Ye. Karnaukhov, Moscow]

[Abstract] The "Nevskiy-402" radio receiver intended for receiving radio broadcasting stations in the medium and short wave bands is described; in the medium wave band, a built-in ferrite antenna is used while in the short wave band, a built-in telescopic whip antenna is used. The portable receiver can be connected to a headset through a 2.8 mm dia. jack. The principal receiver specifications are cited and its circuit diagram is presented. The receiver dial is illuminated by tiny incandescent lamps. The Nevskiy-402 receiver is executed on a single integrated circuit and four bipolar and one field-effect transistors. The operating principle is explained in detail. The Nevskiy-402 radio receiver weighs less than 300 grams and is encased in a rigid shockproof polystyrene housing. Its overall dimensions are 130x74x30

mm. The receiver has a 9 V power supply system and may run on batteries or from an AC/DC adapter (7D-0.115-VI-1). Figures 2.

Bulletin Board

927K0136F Moscow RADIO in Russian No 11, Nov 91
pp 73, 78-79

[Article by Editorial Board]

[Abstract] New products offered by various companies are advertised: the "Simvol" cooperative is offering cable connector assemblies and integrated circuit plugs for IBM PC/AT; the "Fiztekhn" center is offering subscription to G.N. Levkin's Introduction to IBM PC/AT Circuitry; the "Minskifitkomplekt" cooperative is offering printed boards built to customer specifications; the "Pozyvnoy" cooperative is offering radio station kits; the "Orbita" cooperative is offering high fidelity audio amplifiers, volume and tone control devices, and satellite TV receiver tuners; the "Sigma Ltd" company (Riga) is offering receivers, antennas, and antenna rotators; the "Verter" Scientific Production Association is offering modems for IBM PC/XT and PC/AT and network (Ethernet) and telecommunication services and products; "Megabit" yashchik is offering databases, foreign and domestic catalogues, software, software manuals, and addresses of 120,000 enterprises; ATM is offering micro-computer boards; the "Sezon" computer center and "Artes" enterprise are offering game software, boards for converting Atari-XC12 tape recorders to the Turbo mode, Atari manuals, video game arcade timers, and PROM burners; the Foreign Trade Association of the Central Scientific Research Institute of Automatic Civil Air Traffic Control Systems is offering high-quality parabolic reflectors for satellite television; and the "Elektronika" Scientific Production Association is offering MKE-332/333 button electret microphones. Figures 2.

Improving Enterprise Management Under Conditions of Market Economy

927K0132A Moscow SVETOTEKHNIKA in Russian
No 12, Dec 91 pp 1-3

[Article by V.V. Lityushkin, Lisma Construction Production Association]

UDC 628.9.003

[Abstract] Changes brought about by a transition to the market economy and the development of a single economic space are discussed and the concepts and methodological recommendations formulated at the Lisma association for developing a three-loop MIS-based administrative structure which addresses the management system development as an engineering design are presented. This management system is called upon to facilitate the transition from the command administrative system to market relations and eliminate unnecessary management elements as well as improve the efficiency of existing structures. The system is profit-oriented and is aimed at increasing productivity on an expanded scale. In addition to direct management and long-range planning aspects, the system stipulates specific social goals, such as skills retraining. The use of computer

methods to develop optimum small enterprise management models is considered. Examples of a small enterprise set up in the framework of the transition program are cited for illustration.

Series of Compact 18, 24, and 36 W Fluorescent Lamps

927K0132B Moscow SVETOTEKHNIKA in Russian
No 12, Dec 91 pp 4-5

[Article by V.F. Dadonov, N.T. Murzina, A.A. Prytkov, All-Union Light Source Institute imeni A.N. Lodygin]

UDC 621.327.534.15

[Abstract] The development of a series of compact fluorescent 18, 24, and 36 W lamps (KLL)—KL18/TBTs, KL24/TBTs, and KL36TBTs (TU16—90 IKVA 67510 016TU)—intended for operation in general and local lighting fixtures (OP) in rooms of residential and commercial buildings supplied by 220 V 50 Hz power mains at an ambient temperature of 5-35°C is reported and the design and overall dimensions of these lamps are presented. The voltage and current ratings, luminous flux, chromaticity coordinates, color rendition index, color temperature, and base type of the three lamps are summarized. The effect of the ambient temperature on the lamps' color and electrical parameters, the temperature distribution on the compact fluorescent lamp surface as a function of the burning position, compact fluorescent lamp emission spectra, luminance distribution on the compact fluorescent lamp surface, and compact fluorescent lamp luminous flux stability are examined and plotted. The luminous flux decreases by an average of 15 percent after 2,000 h of burning and 25 percent after 5,000 h. Figures 10; tables 1.

On Certain Ecological Aspects of Fluorescent Lamps

927K0132C Moscow SVETOTEKHNIKA in Russian
No 12, Dec 91 pp 12-13

[Article by R.F. Kirsanov, A.M. Kokinov, V.S. Loginov, All-Union Light Source Institute imeni A.N. Lodygin]

UDC 628.9:658.567.1.004.8

[Abstract] Ecological aspects of fluorescent lamps (LL) stem from the need to ensure their safe use, production, and disposal. Purely engineering designs must be complemented with environmental management of fluorescent lamp production and use. The specific issues of fluorescent lamp production are considered from the viewpoint of using their harmless components—primarily mercury—and safely disposing them in accordance with existing environmental legislation. The experience gained at the Lisma production association in reducing the amount of mercury and increasing its handling safety in the course of fluorescent lamp production is summarized. It is shown that out of an annual mercury consumption of 1,000 ton in the USSR today, fluorescent lamp production amounts to almost a quarter (23.4 t), but implementation of new technologies will make it possible to decrease this figure to 9.5 t/year. The byproduct of extensive use of fluorescent lamps is a lower consumption of electric power with an attendant decrease in

toxic emissions of fossil fuel combustion products. References 8: 7 Russian, 1 Western.

All-Union Scientific-Engineering Symposium on Discharge Light Sources

927K0132D Moscow SVETOTEKHNIKA in Russian
No 12, Dec 91 pp 26-27

[Article by V.A. Petrova, All-Union Scientific Research Institute of Light Sources]

UDC 621.327.06.053

[Abstract] The proceedings of the All-Union Scientific-Engineering Symposium on Discharge Light Sources organized by the Elektrosvetotekhnika All-Union Association, the All-Union Scientific Research Institute of Light Sources (IS), and Poltava Gaseous Discharge Lamps Plant (PZGRL) are reported. The symposium was held in Poltava on 15-18 October 1991 and drew more than 70 experts from 28 scientific research and academic institutes and enterprises; four plenary reports were presented at the symposium. They covered the issues of electric energy savings from using compact fluorescent lamps, minimizing or eliminating the mercury use in the development of gaseous discharge lamps, new phosphor development, and industrial and economic aspects of light source development. The symposium recommended, *inter alia*, that the development of compact fluorescent lamps be accelerated, work on developing ecologically clean lamp designs be continued, and studies aimed at developing nonmercury compact fluorescent lamps be expanded. The next symposium is tentatively scheduled for 1994.

RF Amplifier for 11 GHz Satellite TV Broadcasting Equipment

927K0128A Moscow RADIO in Russian No 7, Jul 91
pp 40-43

[Article by V. Botvinov (UB5EAG), Krivoy Rog]

[Abstract] Home satellite TV broadcast (STV) reception systems and their components are discussed and a low-noise

amplifier—one of the most difficult satellite TV broadcast reception units—employing domestically manufactured radio elements is described. The circuit diagram of a low-noise RF amplifier with bipolar power supply is cited and its components are described. The RF three-stage low-noise amplifier has a 10.95-11.60 GHz frequency band, a noise factor of no more than 3 dB, and a gain of at least 20 dB. AP324 and AP326 transistors are used in each stage. The amplifier is executed with printed boards with striplines. The low-noise RF amplifier is capable of reliably receiving TV programs from the STAR-1, TV-5, Superchannel, CNN, and other satellites in the European part of the USSR and the ASTRA-1 in western Ukraine and Belarus as well as Baltic states. Procedures for assembling the amplifier and installing the transistors are recommended. Several such amplifiers have been made by the authors. Figures 5; tables 1.

Computer Radio Networks

927K0128B Moscow RADIO in Russian No 7, Jul 91
pp 12-13

[Article by S. Bunin, Kiev]

[Abstract] The proceedings of a conference devoted to the state of, and outlook for, computer network development held in March 1991 in Kiev are reported. The conference was organized by a number of scientific research institutions, the Astra computer radio network association, and the Ukrainian Knowledge Society and drew representatives from 63 organizations involved in the development and implementation of computer networks using radio channels as a physical communication medium. Reports presented at the conference dealt with terrestrial short and ultrashort wave networks using special repeaters for amateur digital radio communication, bulletin board systems (BBS) and their capabilities (including the forwarding function), packet communication networks, and other issues. The conference emphasized the need to hold a union-wide conference on radio communication-based computer networks in 1992 and accelerate the development of a ham radio section in the framework of the association. Conference organizers are hopeful that the conference will give an impetus to the development of computer (EVM) networks in the country.

Optimum Integrated Space-Time Signal Processing Through Partially Colored Noise*927K0139A Moscow RADIOTEKHNIKA in Russian No 11, Nov 91 pp 3-8*

[Article by A.S. Bogachev]

UDC 621.396:629.7.05

[Abstract] Trends in improving the performance (TTKh) and design of integrated avionics (REK) data systems (IS) by switching to the multichannel principle with the help of antenna arrays (AR) and realizing space-time signal processing are considered and an attempt is made to use Markov's integration theory to synthesize algorithms of optimum or quasioptimum primary integrated space-time processing (KPVO) of radio signals from a distributed antenna system (RAS) (which represents a combination of partial two-dimensional arrays) and output signals of the aircraft's (LA) proper motion indication system by the integral square filtering error criterion. The problem is formulated and the quasioptimum algorithm of integrated space-time signal processing is developed. Without loss of generality, the synthesis is performed for the processing of continuous signals assuming that the radio signals on the output of partial array elements are received through wide-band white noise while the output signals of nonelectronic instruments are received through colored noise. The algorithm takes into account the spatial structure of the distributed conformal antenna system, the spatial distribution of the set of tracked targets, and the specific features of the nonelectronic instrument errors and is thus suitable for synthesizing a broad class of prospective electronic systems with integrated primary space-time processing. References 6.

Efficiency of Amplitude Suppressor of Noise With Bimodal Distributions*927K0139B Moscow RADIOTEKHNIKA in Russian No 11, Nov 91 pp 8-10*

[Article by V.A. Cherdyn'tsev, A.V. Ovsyannikov, V.M. Kozel]

UDC 621.391

[Abstract] The use of robust algorithms of detection and discrimination through strong nonGaussian noise in order to improve the quality of small signal detection and the use of robust suppression devices—instantaneous nonlinear converters (BNP)—is discussed; the robust characteristic of the instantaneous nonlinear converter designed for suppressing noise with bimodal probability distribution density (PRV) and executed as a binary quantizer (BK) is studied and its efficiency is analyzed. The class of noise with a bimodal probability distribution density is investigated and a block diagram of the instantaneous nonlinear converter is presented. The results demonstrate that the use of the generalized binary quantizer with adaptive threshold tuning ensures efficient detection of small signals through noise with both bimodal and unimodal probability distribution density. Figures 1; tables 1; references 6.

Distance Measurement by Linear FM Signal at Unknown Doppler Frequency*927K0139C Moscow RADIOTEKHNIKA in Russian No 11, Nov 91 pp 17-19*

[Article by Ye.B. Volochkov]

UDC 621.396.96

[Abstract] Echo signal carrier shift due to the Doppler effect, which is proportionate to the range rate and results in distance measurement errors, is discussed and an attempt is made to demonstrate the possibility of using the maximum likelihood method (MMP) as well as linear filtering methods in order to assess the radial coordinate of the radar target without having data on the target's range rate with the help of a sample of single range measurements taken by a linear FM (LChM) signal. The law of the instantaneous linear FM signal frequency change is derived and a popular polynomial trajectory model is considered. The polynomial trajectory is then estimated by the maximum likelihood method and the dependence of the range estimate variance on the number of measurements is plotted. It is shown that in the absence of data on the target's Doppler frequency, i.e., its range rate, it is indeed possible to estimate the range coordinate very accurately with the help of an LFM signal using the linear filtering method on the basis of the maximum likelihood method. If the range measurement period is much less than the proportionality coefficient, it is expedient to alternate the frequency modulation sign in order to increase the trajectory parameter estimation accuracy. Figures 1; references 4.

Characteristics of Target Detection in Conflict-Interaction Radar Environment*927K0139D Moscow RADIOTEKHNIKA in Russian No 11, Nov 91 pp 19-21*

[Article by V.M. Shlyakhin]

UDC 621.37:621.391

[Abstract] The use of radar countermeasures imparts a conflict aspect in radar detection tasks: a radar (RLS) selects an appropriate search strategy so as to be the first to detect the target and do so at the maximum range while the target selects its own strategy in order to "outplay" the opposite side, evade detection, and shorten the range as much as possible. The effect of the parameters of such a conflict-interaction of the radar with the target being sought on the radar target detection probability is assessed. The probability of target detection within a specified time is used as the principal radar efficiency indicator. The conclusion is drawn that in the radar conflict environment, the radar performance algorithm must stipulate the response to the search object's anticipated detection avoidance strategy; otherwise, efficient target detection becomes either impossible or calls for excessive time outlays. The results describe the so-called unilateral duel, a situation where only one side—the target being sought—resorts to countermeasures. It is speculated that in practice, it is likely that the detection facility may also try to evade countermeasures. Figures 1; references 5.

Optimum Space-Time Stochastic Signal Processing Under Moving Antenna Conditions

927K0139E Moscow *RADIOTEKHNIKA* in Russian
No 11, Nov 91 pp 24-27

[Article by I.I. Gorban]

UDC 621.391:621.396

[Abstract] The methods of optimizing space-time processing of signals for moving antennas with complex linear and angular displacements in space originally derived by the author (*Radiotekhnika* No. 12, 1990) for quasideterministic signals is extended to stochastic signals, and algorithms are synthesized for optimal processing of such signals. It is assumed that the signal and noise are Gaussian, have a null mathematical expectation, and are described by space-time correlation functions. Processing optimization is performed by the maximum likelihood function criterion and two processing optimization cases are considered: where the signal and noise are stationary; and where the antenna does not have enough time to move in space during a certain time interval. References 4.

Simulation of Digital Radio Link Employing Signals With Wide Relative Band

927K0139F Moscow *RADIOTEKHNIKA* in Russian
No 11, Nov 91 pp 31-33

[Article by V.V. Krylov, A.A. Kochetkov, V.A. Kochanov, I.Ye. Tarlakovskiy, Ye.V. Borisov]

UDC 621.396.67

[Abstract] Interest in radar and data transmission by super-wide-band signals is noted and the principal results of binary data transmission link simulation are presented. Data are transmitted in the link by composite signals with an octave bandwidth over a channel with a spurious beam and additive noise. A receiver with main band processing is examined for this purpose and a set of codes permitting efficient matched filter realization in the microwave (SVCh) band is determined. Simulation is performed with the help of a VEGA functional simulation system and the simulation cycle includes 500-700 character transmission realizations. The effect of the signal/noise ratio at the model input and limiter-type nonlinearity on the error rate is examined. The results show that the use of wide-band octave composite signals manipulated by base-8 Welte codes makes it possible to realize a modem operating with an error rate of no more than $5 \cdot 10^{-2}$, a signal/noise ratio of no more than 3 dB in a channel with hard limiting, a spurious beam, and a synchronization error reaching 60 percent of $1/\Delta F$. Figures 8; references 4.

Adaptive Median Detector

927K0139G Moscow *RADIOTEKHNIKA* in Russian
No 11, Nov 91 pp 33-37

[Article by V.A. Polyakov, R.G. Tolparev]

UDC 621.391.1

[Abstract] An attempt is made to develop an adaptive median detector algorithm which is capable of significantly

decreasing the noise sample size necessary for estimating the medians. To this end, the decision statistics of one of the most perfect median detectors which ensures the false alarm (LT) probability stabilization through unknown noise are investigated. Physically, the detector is realized as a signal channel and a group of independent noise reference channels in combination with processing units for the resulting signal and noise readings. The proposed algorithm makes it possible to lower the reference noise sample necessary for estimating the noise medium by several times and can be recommended for practical applications. References 5: 4 Russian, 1 Western.

Directional Coupler-Based Receiving Active Log-Periodic Antenna

927K0139H Moscow *RADIOTEKHNIKA* in Russian
No 11, Nov 91 pp 64-67

[Article by M.P. Tilichenko, V.Ya. Yatskevich]

UDC 621.396.67

[Abstract] Ways of overcoming the shortcomings of log-periodic antennas, such as their poor directivity, large size, and upper bound limitations of the working band, are discussed and an effort to expand the frequency band of an active log-periodic antenna (LPA) to the upper frequency range is considered. The proposed antenna consists of vertical monopoles forming a linear array whereby the monopole dimensions are selected from the optimum noise parameters while the spacing between them is subject to the geometrical progression law. Each unipole is connected to the input of identical wide-band amplifiers whose bandwidth is equal to that of the antenna. The outputs of each amplifier are connected through a low-pass filter (FNCh) to the primary line of directional couplers (NO) with coupled TEM-wave lines. The second end of each primary directional coupler line is loaded by a matched load while the secondary directional coupler lines are connected in stages, forming the antenna bus. The antenna is analyzed numerically. The results show that the antenna's principal advantage is its ability to expand the working frequency band upward; its upper cutoff frequency is limited only by the frequency band of the wide-band amplifiers used and in today's devices may reach the centimeter band wavelengths. Figures 4; references 3.

Radiophysical Instrument System With Composite Millimeter Band PSK Signal

927K0139I Moscow *RADIOTEKHNIKA* in Russian
No 11, Nov 91 pp 67-70

[Article by Yu.V. Opalenov, A.A. Potapov, S.Yu. Fedyunin]

UDC 621.396.96

[Abstract] A trend toward using composite probing millimeter band (MMV) linear FM signals in environmental remote sensing systems and their advantages are discussed, the design of such a system is described, and the potential of the proposed radiophysical instrument system is estimated. A block diagram of the remote sensing system is cited and characteristic envelopes of echo signals from various types of surfaces measured from a helicopter flying at a 50-70 m

altitude are presented. The horn antenna has an 8° beam-width; vertically polarized radiation with a 65° incidence is used. An analysis demonstrates that the radiophysical instrument system is a promising and highly efficient tool for solving various scientific and application problems under the conditions of rapidly changing environmental parameters. Figures 2; references 16: 15 Russian; 1 Western.

Method of Analyzing Video Pulse Parameters in Waveguide Structures With Nonlinear Films

927K0139J Moscow *RADIOTEKHNIKA in Russian*
No 11, Nov 91 pp 73-75

[Article by A.G. Glushchenko]

UDC 621.372.8

[Abstract] Soliton generation with an RF signal envelope in waveguides with the help of thin films with nonlinear parameters for the purpose of developing noise-immune communication systems with an increased transmission rate is discussed and the possibility of generating stationary video pulses by utilizing the dispersion characteristics of waveguide structures with thin films characterized by a nonlinearity in the form of the field power function is investigated. The waves in a strip structure with dielectrics and a film between them are considered, boundary value conditions in the film plane are examined, and formulas are derived for calculating the parameters of solitary stationary pulses for typical cases of nonlinearity. It is demonstrated that the method may be used for designing various types of waveguide structures and that higher-order nonlinearity (fourth or higher) may be taken into account in a similar fashion. Figures 1; references 4.

Radiation Pattern of Rectangular Microstrip Antenna and Passive Dipole Array

927K0139K Moscow *RADIOTEKHNIKA in Russian*
No 11, Nov 91 pp 75-77

[Article by N.N. Gorobets, M.V. Nesterenko, V.A. Petlenko, A.Ya. Pchel'nikov]

UDC 621.396.67.049

[Abstract] The pattern (DN) of real microstrip antennas (MPA) of finite dimensions has side-lobe and backfire radiation due to additional scattering by the edges; this factor prompted an experimental study of the effect of a passive dipole array on the radiation characteristics of microstrip antennas. To this end, a rectangular radiator is placed over a fine screen on a base with a known dielectric permittivity and the radiator's pattern is plotted in the *E*-plane in the shorter wave end of the decimeter band. The possibility of suppressing the spurious sideband radiation due to the effect of wave interference of the radiator, screen edges, and array dipoles is examined and the resulting composite radiation pattern is plotted. The study made it significantly possible to reduce the side lobe radiation level of microstrip antennas with the help of passive tuned dipoles while maintaining the planar dimensions of the structure. Figures 2; references 5: 3 Russian, 2 Western.

Study of Sea Clutter Polarization Characteristics

927K0139L Moscow *RADIOTEKHNIKA in Russian*
No 11, Nov 91 pp 77-79

[Article by N.N. Badulin, D.A. Frolov]

UDC 621.396.96

[Abstract] Distortions of the radio waves' polarization characteristics at small grazing angles are discussed and an attempt is made theoretically to explain the data of an experimental study of the polarization characteristics of sea clutter at small grazing angles conducted in the 3 cm band with the help of a special unit installed on board a research vessel in the Pacific Ocean. The emitted and echo signal polarization was changed from vertical to horizontal with the help of a ferrite polarization plane shifter synchronously with the probing pulses. The mean ratio of signals received in two adjacent pulse repetition periods is used as the diagnostic variable. The results indicate that polarization characteristics of the sea surface largely depend on its roughness as well as the spatial anisotropy of its properties due to the wind-generated waves' anisotropy. An electrodynamic simulation of the sea surface by elementary scatterers located on the slopes of wind-generated waves is consistent with the results of experimental studies. A decrease in the vertical/horizontal polarization ratio with an increase in the wind velocity is attributed both to an increase in the maximum wind-generated wave slope and a decrease in the mean elementary scatterer anisotropy (probably due to foam and drops); this may also explain the higher vertical/horizontal polarization ratio when the antenna is oriented along the wind since in this case the foam and drops are in the wind-generated waves' shadow at small grazing angles. Figures 3; references 3.

Analytical Procedure of Estimating Ionosphere's Effect on Space Communication System Noise Immunity

927K0139M Moscow *RADIOTEKHNIKA in Russian*
No 11, Nov 91 pp 80-83

[Article by V.N. Pashintsev, A.D. Sapozhnikov, L.L. Vitilov]

UDC 621.371.3:621.391.1

[Abstract] The effect of the dispersing and scattering properties of the disturbed ionosphere on noncoherent detection of wide-band signals (ShPS) in space communication systems (SKS) is discussed and an analytical procedure is proposed for taking into account these properties; it calls for finding the functional dependence of the error rate on the carrier frequency and bandwidth of the wide-band signals being transmitted and the physical parameters of the ionosphere—the mean electron concentration and irregularity frequency—which determine its scattering and dispersing properties. An approach based on comprehensively employing the statistical radiophysics and communications theory methods is suggested for developing the analytical procedure. Examples illustrating the fitness of the proposed procedure are cited and it is shown that further research is

necessary in order to ascertain the effect of free space diffraction on the noise-immunity of space communication systems. References 5.

Fiber Optic Interference Sound Transducer

927K0139N Moscow *RADIOTEKHNIKA in Russian*
No 11, Nov 91 pp 91-94

[Article by Ye.I. Andreyeva, N.Yu. Smirnova]

UDC 681.7.068

[Abstract] The phase drift in the interferometer arms of a fiber optic sound transducer caused by the optical fiber's (OV) sensitivity to temperature fluctuations complicates the operation of fiber optic transducers (VOD); this factor prompted an attempt to minimize the susceptibility of fiber optic transducers of acoustic fields to thermal noise by redesigning their sensors. In contrast to conventional fiber optic transducers, the optical signal phase is modulated in both arms of the interferometer whereby acoustic vibrations have a counterphased effect and thermal fields have an cophased effect; as a result, the fiber optic transducer's acoustic sensitivity is doubled while the temperature phase incursion is compensated. The fiber optic transducer design is described and its amplitude-frequency response is plotted. An analysis demonstrates that in addition to its high acoustic sensitivity, the fiber optic transducer of acoustic fields has a flat amplitude-frequency response and an elevated temperature stability. Figures 3; references 7: 3 Russian, 4 Western.

Analysis of High-Power Two-Impedance Reflector-Type Microwave Devices

927K0139O Moscow *RADIOTEKHNIKA in Russian*
No 11, Nov 91 pp 104-105

[Article by Yu.M. Zeldin]

UDC 621.372.852.2

[Abstract] The significant dependence of the toggle oscillator diode impedance in both of its states on the first harmonic voltage prompted a study of the method of synthesizing microwave (SVCh) reflector-type two-impedance devices (DIU) on the basis of a specified input power rating, toggle function, and impedance characteristics of the toggle element in each of its states. To this end, two-impedance device analysis is reduced to synthesizing a reactive transforming four-terminal network (TCh) which matches the impedance with the characteristic admittance of the main transmission line. The toggle element reflectance as a function of voltage is found. The results show that a microwave two-impedance device can be synthesized for a given input power allowing for the toggle nonlinearity and make it possible to analyze its amplitude characteristics. Figures 1; references 2.

Recursive Aircraft Flight Path Filtering and Interpolation Algorithms

927K0118A Moscow *RADIOTEKHNIKA in Russian*
No 7, Jul 91 pp 12-13

[Article by E.M. Khazen]

UDC 621.396.96

[Abstract] The urgency of developing new computer-aided air traffic control systems (AS UVD) dictated by the rising traffic volume is identified and the outlook of using more advanced real time radar data processing algorithms due to the increased computer efficiency is recognized. General relations are implemented for the aircraft (VS) tracking and air traffic control tasks on the basis of measuring the aircraft coordinates or bearing with or without range rate measurements and with or without data on the aircraft flight plan. A single recursive algorithm making it possible to execute continuous aircraft tracking on the basis of diverse measurements with unequal accuracy, as they arrive, is derived; moreover, recursive formulas are derived for solving the problem of interpolating or reconstructing the unobservable components of a random Markovian process in a general case of a linear system with discrete time. It is found on the basis of the precise solution of the aircraft flight path filtering problem that the accuracy of the aircraft velocity vector estimation virtually does not depend on the range measuring accuracy within a 0.05-150 km interval. References 3.

Generation of Spectrally Pure Oscillation in Digital Computational Frequency Synthesizers

927K0118B Moscow *RADIOTEKHNIKA in Russian*
No 7, Jul 91 pp 16-19

[Article by V.G. Luchkov, S.V. Shamshin]

UDC 621.373.421

[Abstract] The need to attain a high speed (on the order of fractions of microseconds) of frequency synthesizers for modern communication systems and generate oscillations with a noise level of -100 dB or lower is identified and the effect of the output signal shape of the digital computational frequency synthesizer (TsVS) on its spectral response is investigated. A block diagram of the digital computational frequency synthesizer is cited and its operating principle is explained. The spectral response characteristic of the digital computational frequency synthesizer of two-level signals with an input signal shape transformation is considered; the methods of spectral Fourier analysis and the procedure based on representing the output signal of the digital computational frequency synthesizer as a sum of an ideal signal and a noise signal and on calculating the initial signal spectrum as a sum of these signals' spectra are used. The results of an experimental investigation of the spectral response of a digital computational frequency synthesizer model realized by integrated circuits with a Schottky transistor-to-transistor logic (TTLSh) are consistent with theoretical data. It is shown that a transition to triangular or sinusoidal shape leads to a decrease in the spectral noise components. The shape transformation of the output signal makes it possible significantly to improve the spectral response of digital computational frequency synthesizers and in a number of cases, get rid of noise spectrum components almost completely. Figures 2; references 8: 7 Russian; 1 Western.

Space-Time Signal Processing in Radio Communication Systems

927K0118C Moscow *RADIOTEKHNIKA* in Russian
No 7, Jul 91 p 30

[Article by A.P. Rodimov (editor in chief), N.N. Buga, N.I. Burenin, Ye.I. Glushankov, A.K. Zhuravlev, Ye.F. Kamnev, A.V. Kuzichkin, I.R. Sivakov, A.M. Chudov]

[Abstract] A promotional announcement for a two-part supplement to the *Radiotekhnika* journal; the supplement is devoted to the issue of developing and implementing the methods of space-time signal processing (PVOS) in antenna systems with real and synthetic apertures for radio communication systems in order to increase the electromagnetic compatibility (EMS) and increase the noise immunity. Simulation of Gaussian and nonGaussian signals in adaptive antenna arrays (AR) and use of complex space-time signals for solving electromagnetic compatibility problems as well as characteristic features of the methods of space-time signal processing are considered.

Relay Interpretation of Delayed Echo Signals

927K0118D Moscow *RADIOTEKHNIKA* in Russian
No 7, Jul 91 pp 42-46

[Article by A.G. Shlionskiy]

UDC 621.396.24

[Abstract] Various interpretations of the characteristics of delayed echo signals (ZES) which have been observed throughout the world since the late 20's (in experiments with radio probing of the Moon, Mars, etc.), whereby it has been generally assumed that physical retarding mechanisms were at work, are reviewed and model versions of the relaying interpretation of a sequence of radio signals with rapidly varying multisecond delays are considered. The general insolvency of the relaying interpretation is demonstrated but the conclusion is drawn that the results of the relaying interpretation may be dismissed as unrealistic only in the case where other physical factors responsible for the observed peculiar features can be identified. It is shown that the use of corrected data on the structure and dynamics of the medium make it possible, in principle, to assess the feasibility of the mechanisms generating the delayed echo signals with their unique energy, dispersion, Doppler, and other characteristics. Figures 1; references 12: 5 Russian; 7 Western.

Simplified Algorithm of Bicoordinate Gradient Descent in Problems of Antenna Array Adaptation With Discrete Phase Shifters

927K0118E Moscow *RADIOTEKHNIKA* in Russian
No 7, Jul 91 pp 63-65

[Article by D.V. Nezlin, V.I. Dzhigan]

UDC 621.396.677

[Abstract] Ways of improving the solutions obtained with the help of coordinate-by-coordinate gradient (PkGS) or cyclical descent algorithms in adaptation problems of phased antenna arrays (FAR) with low-order discrete phase shifters (FV) with the help of the bicoordinate gradient descent

algorithm (BkGS) are considered and an algorithm of simplified bicoordinate gradient descent (UBkGS) which makes it possible to increase the speed of the phased antenna array adaptation compared to coordinate-by-coordinate gradient algorithms is examined. The iterative procedures involved in the simplified bicoordinate gradient descent algorithms are outlined. Radiation patterns of the phased antenna array with eight elements and five phase shifter digits when suppressing two interference signals arriving in the side lobe maxima directions and the dependence of the radiation pattern gap depth of a phased antenna array with eight elements as a function of the phase shifter order for the simplified bicoordinate gradient descent algorithm and the coordinate-by-coordinate gradient algorithm are plotted. An analysis reveals that the simplified bicoordinate gradient descent algorithm is an adequately efficient means of improving the solutions of antenna array adaptation problems with discrete phase shifters. Figures 2; references 3.

Two-Coordinate Acoustooptic Device for Accessing Fiber Optic Transmission System Transceiver Station

927K0118F Moscow *RADIOTEKHNIKA* in Russian
No 7, Jul 91 pp 78-80

[Article by Y.G. Vasilyev]

UDC 621.373.826:621.376

[Abstract] The steadily increasing capacity of fiber optic communication networks, the rising volume of data traffic in them, and the increasing number of transceivers (PPS) being connected to fiber optic transmission systems (VOSP) with a varying architecture necessitate the development of optical shunting (rerouting) of failed transceiver station and organizing a new access method. A two-coordinate acoustooptic access device (DAUD) which enables a transceiver station operating in a two-trunk fiber optic transmission system to access the network is considered. The design of the device is described and its block diagram is presented; its functional capabilities and operating modes for connecting station terminals to trunk optical fibers are described. The two-coordinate acoustooptic access device may also be used for connecting two trunk optical fibers to each other and makes it possible greatly to expand the functional capabilities of transceiver stations by ensuring their operation in the transmit and receive conditions and perform optical shunting. Figures 2; references 4.

Accuracy Characteristics of Three-Coordinate Optical Displacement Transducer With Coherent Processing

927K0118G Moscow *RADIOTEKHNIKA* in Russian
No 7, Jul 91 pp 80-82

[Article by V.I. Shcherbak, V.V. Lisov]

UDC 621.376:681.325

[Abstract] The accuracy characteristics of multiparametric optical instruments with coherent processing are discussed and an attempt is made to investigate the potential accuracy characteristics of an optimal (by the maximum likelihood criterion) optical displacement transducer when its optical

axis is deflected significantly from the direction toward the point source for the same initial conditions as those adopted earlier by Shcherbak; as a result, relationships are derived for a three-coordinate meter. An analysis shows that the use of the optimal meter's optical axis deflection from the direction toward the point source makes it possible greatly to increase the accuracy of linear displacement measurements. At a significant range, a high accuracy of radial displacement component measurement in meters with coherent processing may be obtained only in the case where the meter's optical axis is deflected from the direction toward the point source; in this case the accuracy of linear displacement measurement in the source plane may be increased by tens of times and the radial displacement measurement accuracy—by more than 10^4 times. Figures 2; references 3.

Investigation of Sea Ice Electric Characteristics Anisotropy Using Subsurface Radar Sounding From Aircraft

927K0117A Moscow *RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 8, Aug 91*
pp 1425-1430

[Article by M.I. Finkelshteyn, P.D. Danshin, A.N. Peshkov]
UDC 621.371 (211.6)

[Abstract] Sea ice contains a solid phase (pure ice and crystallized salts), a liquid phase (brine), and gaseous inclusions, leading to an anisotropy of electric properties which cannot be identified adequately by means of standard radar experiments from the surface. Consequently, airborne experiments were conducted in order to investigate the anisotropy of year-old sea ice in the horizontal plane. The studies reveal that the amplitude ratio of orthogonally polarized signals reflected by the lower boundary of the ice reaches 8 dB and establish that such anisotropy is especially typical of year-old ice with a 70-120 cm mean thickness. Orthogonally polarized signals reflected from a smooth sea surface and year-old ice are compared and their normalized spectra are plotted. The results of the experimental study of the amplitude ratio of signals reflected from both the lower and upper boundary of the ice in orthogonal direction and specific attenuation in the sea ice layer are summarized as a function of the ice thickness. In some cases, significant ice thickness measurement errors are recorded due to the anisotropy of ice's dielectric permittivity; the ratio of dielectric permittivity values in the orthogonal directions reaches 1.4. It is shown that the use of polarization characteristics of the echo signals may ensure a higher radar sea ice thickness measurement accuracy. Figures 4; tables 1; references 11: 9 Russian; 2 Western.

Surface Acoustic Wave Scattering by Local Surface Resonances

927K0117B Moscow *RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 8, Aug 91*
pp 1474-1488

[Article by Ye.A. Garova, V.P. Plesskiy, A.V. Simonyan]
UDC 534.231.01

[Abstract] The so-called local acoustic resonances, or resonances of the surface shape, are addressed and scattering of

surface acoustic waves (PAV) by such resonances is investigated. In particular, it is shown that elements with natural resonances on the incident wave frequency may play the role of local wide-band reflectors of surface waves with a high reflectance. Scattering of Rayleigh and Gulyayev-Bleustein waves (VGB) by a single resonating element on a solid surface is considered; these types of surface waves have a different spatial structure and polarization. It is shown that Rayleigh waves' coefficient of energy reflection from a single resonating element may reach close to 0.25 in magnitude while that of Gulyayev-Bleustein waves may reach 0.6. Such elements may be used as mirrors and opaque reflectors in devices employing surface acoustic waves. Today's technology makes it possible to manufacture complex micrometer-size elements on the surface of solids with natural resonances on 100-1,000 MHz frequencies for use in surface acoustic wave experiments and devices. The authors are grateful to A.A. Maradudin for discussing the theory of surface acoustic resonances and stimulating this effort. Figures 9; references 15: 9 Russian; 6 Western.

Problems of Antiparaxial Expansions Theory in Dense Electron Beam Optics

927K0117C Moscow *RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 8, Aug 91*
pp 1545-1558

[Article by V.A. Surovoy]

UDC 537.533.2.01

[Abstract] The principal findings of the theory of antiparaxial expansions as expansions into asymptotic series in terms of a geometrical perturbation, which in some cases are transformed into coordinate expansions of a special structure, formulated by the author in *Radiotekhnika i elektronika* Vol. 36 No. 3, 1991 are presented and attention is focused on the main issue of any approximate model: its accuracy and applicability boundaries. A number of measures making it possible to expand these boundaries and the results obtained by applying nonlinear transformations to antiparaxial expansions are outlined. The problem of developing an adequate paraxial theory of spatial beams by using asymptotically precise correlations of the theory of antiparaxial expansions is considered and the role of antiparaxial series in synthesizing nonparaxial relativistic beams in an arbitrarily oriented magnetic field is discussed. In addition, some outstanding problems which, if eventually solved, will facilitate the development of both theoretical and purely tasks problems are identified. Figures 9, tables 5; references 30: 23 Russian; 7 Western.

Origin of Abnormal Dielectric CCl_4 Variance on Infralow Frequencies

927K0117D Moscow *RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 36 No 8, Aug 91*
pp 1589-1592

[Article by A.A. Belov, V.V. Bonch-Bruyevich]

UDC 537.874.7

[Abstract] The complex dielectric permittivity of carbon tetrachloride is measured by two spectrometers simultaneously in order to ascertain the origin of its anomalous

dielectric variance. The use of two spectrometers makes it reliably possible to cover the frequency range under study and increase the confidence of the resulting data. A measurement accuracy of 0.2 percent is attained. The frequency dependence of the real and imaginary components of complex dielectric permittivity of "chemically pure" carbon tetrachloride is examined and plotted and the concentrations of various impurities and surface active substances (PAV) are determined. An analysis of the resulting data makes it possible to estimate the effect of impurities on the dielectric spectrum of CCl_4 and draw the conclusion that the relaxation processes with relaxation times of 1,300 s and 140 s identified on the dielectric permittivity plots are due to the presence of these impurities. It is shown that only the impurities with a lower conductivity than that of carbon tetrachloride cause a considerable increase in the real dielectric permittivity while the conductivity of the substances causing the abnormal variance are lower than that value. Figures 2; tables 2; references 4.

Effect of Sample Measurements on Prediction Accuracy of Territorial Distribution of Spectral Radio Noise Density

927K0117E Moscow *RADIOTEKHNIKA I ELEKTRONIKA* in Russian Vol 36 No 8, Aug 91 pp 1592-1594

[Article by D.S. Dobryak, L.G. Petrova]

UDC 621.396.96.01

[Abstract] The territory-time model of spectral atmospheric noise (ARP) density (SP) in a 0.03-30.0 kHz band as a random function of three independent variables—frequency, time, and geometrical coordinates—formulated by the authors in *Radiotekhnika i elektronika* Vol. 31 No. 6, 1986 is considered and used for estimating the optimum (most likely) estimate of the spectral density of atmospheric noise at a certain point. The model makes it possible to analyze the parameters of the spectral density distribution law, including multidimensional and, allowing for their seasonal and daily behavior for the geographic point under study, predict the anticipated spectral density value and thus determine the confidence interval for a given confidence level. The results show that in the case under consideration the model enables us to derive all the necessary relationships which taken together, make it possible to refine the prediction of the spectral density of atmospheric noise on the basis of its measurements taken in individual noncoinciding points. Tables 1; references 4.

Hot Electron Beam Halo Minimization at Large Drift Length

927K0117F Moscow *RADIOTEKHNIKA I ELEKTRONIKA* in Russian Vol 36 No 8, Aug 91 pp 1597-1600

[Article by A.B. Yesichev, V.D. Ilyushin]

UDC 537.533.2.01

[Abstract] The effect of the hot intensive nonlaminar electron beam halo on the characteristics of the electron optics systems of modern powerful microwave O-type devices, especially thin drift channels, and the difficulties of analyzing multivelocity beams with a halo are discussed. An axisymmetric electron beam in a uniform magnetic field with a uniform concentration up to a certain radius in the initial laminar state is considered and it is assumed that in its initial state, the flux satisfies the equilibrium hydrodynamic equations while its kinetic deformation is Gaussian and isothermal and has a distribution function half-width without additional drift pulses. The equation of the cross-sectional multivelocity equilibrium beam concentration distribution is solved on a PC 386 microcomputer using a Fortran-IV routine and the dependence of the beam halo on temperature at various currents is plotted, making it possible to outline two ways of minimizing the halo—by lowering the concentration on the axis and using a focusing magnetic field—and formulate the requirements for the electron gun generating a beam with a halo. Figures 2; references 5.

Transit-Time Chromatic Aberrations of Electron Optics Systems With Straight Optical Axis

927K0117G Moscow *RADIOTEKHNIKA I ELEKTRONIKA* in Russian Vol 36 No 8, Aug 91 pp 1600-1603

[Article by S.B. Bimurzayev, Ye.M. Yakushev]

UDC 537.533.3.01

[Abstract] It is shown that an analysis of the quality of transit-time charged particle cluster focusing in an electron optical system (EOS) at a relatively large initial particle energy spread calls for determining the transit-time chromatic aberrations (VKgA) of the second and higher order infinitesimal beforehand. Consequently, a method of analyzing the transit-time chromatic aberrations with any given accuracy relative to the spread of particle energies in an electron optical system with a straight optical axis is formulated. It is noted that the above method may also be used for analyzing the transit-time chromatic aberrations of electron lenses. The results demonstrate that for any electron optical system with a straight optical axis, transit-time chromatic aberrations are determined only by the electric field distribution on the axis and do not depend on the type of the field symmetry or the presence of magnetic fields in the electron optical system. References 2.

Acoustic Emission Instrument Complex for Monitoring Heat Treatment Conditions of Polymer Composite Material Products

927K0112A Moscow IZMERITELNAYA TEKHNIKA
in Russian No 5, May 91 pp 41-43

[Article by O.L. Petrovskiy, V.N. Shalygin]

UDC 678.6.028:53.082.4

[Abstract] The need to detect spontaneous departures from the structural continuity of polymer composite materials (PKM) during heat treatment which in the end, may lead to unacceptable macrodefects, is identified and an acoustic emission instrument complex (AEIK) for monitoring the heat treatment condition of items from polymer composite materials developed on the basis of a domestic AF-15 acoustic tester is described. A block diagram of the new nondestructive testing instrument is presented and its operating principle is outlined. The new device makes it possible to ensure an almost 100 percent confidence of detecting and locating structural macrodefects in polymer composite material products thus laying the groundwork for their optimum correction and resolution. The acoustic emission (AE) method's sensitivity exceeds that of the ultrasonic nondestructive testing instrument by almost an order of magnitude, making it a reliable tool for monitoring heat treatment conditions of a wide range of polymer composite material products. Figures 2; references 4.

State of Transducer Development in Europe

927K0112B Moscow IZMERITELNAYA TEKHNIKA
in Russian No 5, May 91 pp 65-70

[Article by B.I. Podlepetskiy]

UDC 53.087.92

[Abstract] The proceedings of the Eurosensor-IV international conference held in Karlsruhe, Germany, in October 1990 and attended by delegates from 20 European countries are summarized. It is noted that in 1989 alone, nearly 3,000 types of sensors valued at over DM 9 billion were produced in Western European countries. A broad range of sensors and transducers covered in 267 reports are described: transducers of mechanical quantities (i.e., pressure, displacement, force, velocity, and acceleration), miniature microphones, resonator-based transducers, chemical sensors, magnetic field induction pickups, temperature-sensitive elements, and hygrometers. It is emphasized that most of today's transducers of physical and chemical quantities are based on the use of high-tech state-of-the-art devices and technologies and that a clear trend toward developing integrated transducers containing sensor and actuator elements with subsequent microprocessor-based signal processing in order to automatically calibrate and/or equalizer the systematic errors is emerging. References: 41 Western.

New Activity Trends of 'Energonadzor' Enterprise at 'Rostovenergo' Electric Utility Under Conditions of Economic Transition to Market Relations

927K0134A Moscow PROMYSHLENNAYA
ENERGETIKA in Russian No 12, Dec 91 pp 2-4

[Article by E.Ya. Molokan]

UDC [621.311:351.824.5].003.13

[Abstract] The new trends emerging in the activity of the Energonadzor power inspection service and the Rostov power utility which services one of the largest administrative units in the northern Caucasus region with highly developed industry and agriculture are examined. Among the steps implemented by the Energonadzor energy inspection service in order to provide incentives for saving electric power is cancellation of the reduced rate (1 kopeck per kWh for rural population). It is shown that a differentiated local two-tier rate should be introduced for electric power used for heating purposes in various zones. A decision is made by the Rostov oblast executive committee to introduce a load-shedding schedule should a shortage of electric power develop during the winter and to levy a penalty on some enterprises found guilty of inefficient energy consumption in the amount of their doubled electric rate. The need to reward users for implementing energy saving steps is recognized.

On New Approach to Determining Discounts and Bonuses for Reactive Power Compensation and Electric Power Quality

927K0134B Moscow PROMYSHLENNAYA
ENERGETIKA in Russian No 12, Dec 91 pp 43-44

[Article by L.F. Poddubnykh, Abakan Department of the Krasnoyarsk Polytechnic Institute]

UDC 621.365.016.25.003.13

[Abstract] Various methods of stimulating measures to compensate for the reactive power and improve the quality of electric power are discussed and the multicriteria optimization (MO) method is analyzed. In so doing, requirements are formulated for the multicriteria optimization method used to determine the discounts and bonuses for reactive power compensation (KRM) and electric power quality (KE). It is shown that under new economic relationships between the energy saving organization (ESO) and electric power users (PE), the methods of multicriteria optimization are suitable for the algorithmic presentation of the discounts and bonuses for reactive power compensation and electric power quality and that the energy saving organizations and electric power users should have equal rights in formulating the optimization criteria while the energy saving organization's criteria should be given technical priority in arriving at a compromise decision. On the other hand, the parties should have economic equality under contractual obligations which should stipulate the optimization criteria, criterion weight coefficients, and compromise values of the objective variables. The parties should rely on common information in determining the discounts and bonuses. The multicriteria optimization method makes it possible to formalize the rate forecasting for long-range planning. Figures 1; references 5.

Marketing and Management of Power Supply to Users: Discussion

927K0133A Moscow PROMYSHLENNAYA
ENERGETIKA in Russian No 10, Oct 91 pp 2-3

[Article by D.M. Voskoboynikov, Energoremproyekt, Riga]

UDC [658.262:658].001.1

[Abstract] The numerous, diverse, and often conflicting administrative, technological, ecological, and economic factors which affect the dynamics of fuel and energy resource consumption in the national economy are discussed and the marketing and management measures necessary for ensuring continuous and adequate power supply service to the users are considered. In particular, the following marketing departments are suggested: department of market research; department of engineering development; advertising and information services department; and marketing management department. With respect to the emerging relationships among the utility companies on the one hand and consumers of electric and heat power on the other, the following aspects of the marketing activity are emphasized: remarketing (i.e., seasonal market reorientation during drops in demand for service), demarketing (when the demand for service greatly exceeds the supply), and synchromarketing (i.e., equalizing the demand at certain periods). The above issues must be resolved by using various differentiated rates, demand regulators, and other measures.

Design and Development Principles of Energy MIS Subsystems of Industrial Enterprises

927K0133B Moscow PROMYSHLENNAYA
ENERGETIKA in Russian No 10, Oct 91 pp 20-21

[Article by V.G. Avvakumov, L.B. Tereshkevich, V.A. Miloserdov, A.M. Volotskiy, A.M. Trubnikova, Vinnitsa Polytechnic Institute]

UDC 658.012.011.56.002.5:681.3

[Abstract] A survey of many management information systems in operation at a number of industrial enterprises demonstrates that, as a rule, they do not contain an energy subsystem, i.e., a crucial element of the plant is not covered by automated management. One possible concept of computer-aided control of the industrial enterprise's power system is considered; to this end, a block diagram of the management information system as a whole and a block diagram of its energy subsystem are presented. User operation with the energy MIS subsystem from the computer terminal workstation in an interactive mode is described. The system is menu-driven and is implemented by an IBM PC; other IBM PC/XT/AT compatible microcomputers are also suitable for this purpose. System operation is illustrated by an example of the electric power mains of an industrial enterprise monitored on a microcomputer screen. The above principle is realized at the Vinnitsa Polytechnic Institute under the name of "Energetik" and may be adapted to the conditions of any specific system. Figures 3.

**Response to Article 'On Improving Relationships
Among Electric Power Users and Suppliers'**

927K0133C Moscow *PROMYSHLENNAYA
ENERGETIKA* in Russian No 10, Oct 91 p 54

[Article by M.M. Bobrov, A.G. Sidorov]

UDC 621.311.4.003.13.001.8

[Abstract] The authors agree with F.A. Olenov's (*Promyshlennaya energetika* No. 12, 1990) assertion that existing relationships among electric power consumers and producers do not provide the former an incentive to develop energy saving programs but strongly disagree that fees should be charged according to the actual electric power at

the power system's combined peak loads since the processes of electric power generation, distribution, and consumption are continuous and virtually concurrent. The authors also dismiss Olenov's suggestion that fees be charged for a uniform electric power demand distribution through the day, i.e., encouraging the load curve equalization. The authors concur with critical comments regarding para. 1.10.1 and 1.10.2 of the "Electric Power Usage" Rules since they are not conducive to developing reactive power compensating systems. Finally, the authors are soliciting responses to A.P. Aleksandrov's article about the relationship between the Moscow Power Utility (POEiE) and its users on the basis of new contractual arrangements (*Promyshlennaya energetika* No. 7, 1990). References 2.

Visualization of Weak Infrared Signals by Anti-Stokes Phosphor in 1.4-1.7 μm Band

927K0063B Minsk ZHURNAL PRIKLADNOY
SPEKTROSKOPII in Russian Vol 55 No 1, Jul 91
pp 104-110

[Article by A.V. Kurochkin, O.Ya. Manashirov, P.A. Mikheyev, D.K. Sattarov, B.V. Smirnov, O.V. Tsyurupa, Leningrad State University, State Optics Institute imeni S.I. Vavilov, and Lyuminofor Scientific Production Association, Stavropol]

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[Abstract] The spectral response and energy characteristics of infrared (IK) anti-Stokes Er^{3+} luminescence in various matrices are studied in order to develop high-efficiency anti-Stokes phosphor (ASL) for visualizing weak radiation fields in a 1.4-1.7 μm band with the help of image converters (EOP). Polycrystal anti-Stokes phosphor three-layered samples consisting of a thin anti-Stokes phosphor layer between two transparent substrates with given parameters were used in experimental studies. The anti-Stokes phosphor was excited by a light-emitting diode radiation with $\lambda_{\text{max}}=1.55$ μm as well as an incandescent lamp with a halogen cycle through a set of light filters; the excitation power flux density varied within 10^{-2} to 10^{-6} W/cm^2 . Luminescence spectra were examined using a computer-aided spectrometer. Experimental anti-Stokes phosphor samples synthesized by the high-temperature solid-phase method were investigated; the following substances were used as the anti-Stokes phosphor basis: oxysulfides, oxychlorides, and fluorides, including $\text{GaF}_2:\text{Er}^{3+}$, and rare-earth element oxides, mixed yttrium, barium, and sodium fluorides, etc. As a result, a two-phase "Ikavizor-1.5" visualizer was developed; the device has a 20-30 lines/mm resolution whereby an infrared excitation power density of 10^{-4} - 10^{-5} W/cm^2 is sufficient to ensure an

image converter screen luminance of 1 cd/m^2 . When an image converter with a Ga-As photocathode is used, the device's sensitivity reaches 10^{-8} - 10^{-11} W/cm^2 . Figures 4; references 28: 24 Russian, 4 Western.

Real Time Digital Recording Equipment for Irregular Processes at Frequencies of up to 7.5 GHz

927K0063C Minsk ZHURNAL PRIKLADNOY
SPEKTROSKOPII in Russian Vol 55 No 1, Jul 91
pp 156-158

[Article by A.F. Denisov, A.G. Kosakovskiy, A.G. Onishchenko, Yu.V. Stasyukinas, Radio Instruments Scientific Research Institute, Vilnius]

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[Abstract] The two most popular methods of recording pulse signals in real time on the basis of a single pulse - direct analog-to-digital conversion (ATsP) with subsequent digital storage and oscillography with subsequent photorecording or conversion to a digital form (digitizing) of the image from the cathode ray tube screen (ELT) - and their advantages and shortcomings are reviewed. Principal specifications of high-speed digital oscillographs and recorder manufacturers in the USSR, the United States, and the Netherlands, particularly the number of channels, sampling rate, capacity, frequency band, RAM volume per channel, and measurement error, are compared. It is shown that the new oscillographic instruments summarized combined with commercial general-purpose devices are suitable for quickly developing multi-channel and computer-aided field and lab instruments for digital recording of irregular processes in real time for a wide range of experimental research tasks within a broad amplitude and frequency band (from direct current to 7.5 GHz) with minimal outlays of time or resources. Tables 1; references 2: 1 Russian; 1 Western.